U.S. Department of the Interior U.S. Geological Survey

Digital Release of Stream-Sediment, Heavy-Mineral-Concentrate, Soil, and Other Geochemical Data Collected in the Nabesna 1° x 3° Quadrangle, Alaska

Ву

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INTRODUCTION

The historic geochemical data presented here were compiled from the Rock Analysis Storage System (RASS) of the U.S. Geological Survey National Geochemical Database (NGDB). The RASS database consists of multi-element chemical and spectrographic analyses for approximately 700,000 geochemical samples collected from the mid-1960's to the late 1980's

Reconnaissance geochemical sampling and analysis was conducted in the Nabesna quadrangle in the late 1960's and early 1970's as part of the Alaska Mineral Resource Assessment Program (AMRAP). Although collected primarily for mineral resource studies, these geochemical data may be useful for environmental or other mineral resource studies in the region. The purpose of this report is to release these data in a more modern, easy-to-use format. While compiling the data for this report, sample coding and geochemical data were inspected and gross errors were corrected. Although these geochemical data reside in the NGDB, the data for the Nabesna quadrangle were not formally published.

The Nabesna quadrangle is bounded by latitude 62° N to 63° N and by longitude 141° W to 144° W. The analytical results for 1,425 stream-sediment, 30 concentrate, 4 organic, and 3 soil samples, primarily collected in the eastern and central portions of the quadrangle, are given in this report. The data files included on this diskette are separated by sample media type. All data files are in dBase III .dbf format. The first three letters of the filename refer to the quadrangle. Letters following the underscore refer to sample media: CONC, concentrates; SED, stream sediments; SOIL, soils; ORG, organic samples.

METHODS OF STUDY

Sample Media

The chemical composition of stream-sediment samples reflects the overall chemistry of rocks contained within the drainage basins. Such information is useful in identifying those basins which contain concentrations of elements that may be related to mineral deposits. Soil samples also reflect the chemistry of underlying rocks, but are more areally restricted.

Heavy-mineral concentrates from stream sediment are selectively enriched in certain minerals, including many that may be ore-related. This concentration process permits detection of some elements that are not easily or reliably detected in bulk stream sediment.

Organic sample media generally refer to vegetation samples collected from specimens growing in the flood plains of a stream or river. These samples were usually collected at or near a corresponding stream-sediment or heavy-mineral-concentrate sample locality. Organic sample media for the Nabesna quadrangle includes needles from spruce trees.

Sample Collection

Stream sediments were obtained from active stream channels. Generally, stream-sediment samples were composited. Heavy-mineral concentrates were collected in conjunction with stream-sediment sampling at a few sites by panning sediment at the sample site. No details are available for the soil and organic samples collected.

Sample Preparation

Stream-sediment samples were air-dried and generally sieved through a stainless steel 80-mesh (0.17 mm) sieve. The minus-80-mesh fraction was saved for analysis. Sieve size fraction information is reported in the stream-sediment data file.

The heavy-mineral concentrates generally were sieved to minus-30 or minus-40 mesh. The sample was further separated with the heavy liquid bromoform into two fractions: a light-mineral fraction (specific gravity 2.86 or less) and a heavy-mineral fraction (specific gravity greater than 2.86). Following heavy liquid separation, magnetite and other strongly magnetic minerals were removed from the heavy-mineral fraction by use of a hand magnet and a Frantz isodynamic magnetic separator set at 0.2 ampere and saved for analysis. The remaining fraction was again sent through the Frantz separator at a setting of 0.6 amperes and the non-magnetic fraction was retained for analysis.

The spruce needles initially were air dried in cloth bags, then pulverized in a blender and ashed in a muffle furnace. The ash was retained for analysis.

Sample Analysis

Stream sediments were analyzed using a semiquantitative, direct-current arc emission spectrographic method (Grimes and Marranzino, 1968). Spectrographic results were determined by visually comparing spectra derived from the sample against spectra obtained from laboratory reference standards. Standard concentrations are geometrically spaced over any given order of magnitude of concentration such that values reported for each sample are reported in the geometric sequence 10, 15, 20, 30, 50, 70, 100 etc. The precision of the Grimes and Marranzino (1968) method is plus or minus one reporting interval at 83 percent, or two intervals at 96 percent confidence (Motooka and Grimes, 1976). The elements analyzed and their nominal limits of determination are listed in table 1. Selected stream-sediment samples were analyzed by atomic-absorption methods for gold, copper, lead, zinc, and tellurium (Ward and others, 1969). Mercury was determined by a mercury-vapor detector developed by Vaughn and McCarthy (1964). Selenium was determined by atomic absorption (fluorometric method). The lower limits of determination for these elements in parts per million are: gold, 0.05; copper, 5; lead, 5; zinc, 5; tellurium, 0.2; mercury, 0.02; selenium, 0.4.

Heavy-mineral concentrates were analyzed by the Grimes and Marranzino (1968) emission spectrographic procedure as described above, with the following modification: to eliminate the spectral interferences caused by high concentrations of iron, 5 mg of prepared sample was used instead of 10 mg, thus raising the lower limit of determination by two steps (Table 1). Selected heavy-mineral concentrates were analyzed for silver, bismuth, cadmium, copper, cobalt, nickel, lead, and zinc by atomic absorption (modification of Nakagawa, 1975). Gold, indium, and thallium contents were determined by atomic absorption (modification of Hubert and Lakin, 1973). The lower limits of determination for these elements in parts per million are: silver, 0.2; bismuth, 5; cadmium, 0.2; copper, 1; cobalt, 1; nickel, 1; lead, 5; zinc, 1; gold, 0.2; indium, 0.2; thallium, 0.2. Selected magnetic concentrates were measured to determine equivalent uranium. The radiation of each magnetic concentrate was reported as percent equivalent uranium and the lower limit of determination is 0.003 percent (Pan and others, 1980).

The ashed spruce needles were analyzed by a semiquantitative, direct-current arc emission spectrographic method developed by Mosier (1972) for the analysis of plant ash.

DESCRIPTION OF DATA

Sample description, geologic, and analytical data are presented in each of the sample media files. Sample site locations are given as latitude and longitude both in decimal degree and degree-minute-second formats in the tables. The following list summarizes table structure and sample description column headings. For table structures, "A6" refers to an alphanumeric format six characters wide, while "N" indicates a numeric column format. Sample description code explanations are listed in Appendix A.

| Table Structure | Column Identifier | Description |
|---|--|--|
| A6 A7 A8 A8 A20 A20 A9 A11 N N A2 A1 A1 A1 A1 | Jobnum Labnum Fieldnum Date_sub Submitter Subm2 Lat_dms Lon_dms D_lat D_lon LL_precis St Mc Sc Rt Ss | assigned laboratory job number assigned sample laboratory number sample field identification number date sample submitted to laboratory submitter name secondary submitter name latitude in degree-minute-second longitude in degree-minute-second latitude in decimal degrees longitude in decimal degrees latitude/longitude precision type of sample media method sample collected sample source rock type structural setting |
| A1 | M | matrix |
| A1 | Os | oxidation state |
| A1 A1 | A Om | alteration ore minerals |
| A1 A1 | Mdf | mineral deposit form |
| A1 | Ga | geologic age |
| A2 | Ms | mesh/sieve code |
| A2 | Sd | additional sample description information |
| A2 | Sd3 | additional sample description information |
| A2 | Sd4 | additional sample description information |
| A2 | Sd5 | additional sample description information |
| A2 | Sp1 | sample lab preparation information |
| A2 | Sp2 | sample lab preparation information |
| A2 | Sp3 | sample lab preparation information |
| A2 A2 | Ft Cm | field treatment lab/submitter comments |

Chemical data follows the above sample description information in the data files. The chemical data are accurate to two significant digits. Trailing zeros are nonsignificant. Columns in which the element headings contain the prefix "S" represent emission-spectrographic data and the prefix "Aa" indicates atomic absorption analyses. The results for all elements are reported in parts per million (ppm) except for iron, magnesium, calcium, sodium, phosphorus, and titanium, which are given in percent (pct). The suffix "p" indicates a partial digestion; "t" indicates a total digestion; and "sw" indicates sample weight in grams. The column heading "Ash_pct" indicates percent ash and "Equiv_u" indicates percent equivalent uranium.

Definitions of the qualifier codes used in the tables are as follows: B, sample not analyzed for this element; N, not detected at the specified level of detection; L, detected, but below the specified limit of determination; G, greater than the specified upper limit of determination; and H, values not determined due to interference.

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Table 1.--Limits of determination for Emission Spectrographic Analysis

| | Mun | determination f nbers in () were | limite hefo | ore 1988 | Analysis |
|---|--------------|-------------------------------------|--------------------|--------------------------------|----------|
| Elements | Lower | Sediments limit Upper l | imit Lowe | Concentrates er limit Upper | limit |
| | | Per | | | |
| | | | | | |
| _ | | | | | |
| Iron (Fe) | | .05 20 | | .1 50 | |
| Magnesium (Mg) | | .02 10 | | .05 20 .1 50 | |
| Magnesium (Mg) Calcium (Ca) Sodium (Na) | • | .05 20 .2 5 | • | .1 50 .5 10 | |
| Titanium (Ti) | • | .002 | | | |
| Phosphorus (P) | | .2 5 | | .5 10 | |
| | - | . 2 5 | | | |
| | | Parts pe | er million | | |
| Silver (Ag) | | 5,000 | 1. | .0 10.000 | |
| Arsenic (As) | 200 | 10,000 | 500 | 20,000 | |
| Gold (Au) | 10 10 | T A A | 2.0 | 1,000 5,000 | |
| | | | 20 | 5,000 | |
| Barium (Ba) | 20 | 5,000 | 50 2 | 10,000 | |
| Beryllium (Be) Bismuth (Bi) | 1 | 1,000 1,000 | 2 | 2,000 2,000 | |
| | 10 | - , | 20 | 2,000 | |
| | 20 (E) 10 | 500 | 50 | | |
| Cobalt (Co) Chromium (Cr) | (5) 10 | 2,000 5,000 | (10) 20 (10) 20 | 5,000 10,000 | |
| Copper (Cu) | | 20,000 | 10 | | |
| Gallium (Ga) | 5 | 500 | 10 | • | |
| Germanium (Ge) | 10 | 100 | 20 | | |
| Indium (In) | 2 | | - - | | |
| Lanthanum (La) | (20) 50 | 1,000 | (50) 100 | 2,000 | |
| Lithium (Li) | | | | - - | |
| Manganese (Mn) | | 5,000 | 20 | 10,000 | |
| Molybdenum (Mo | | 2,000 | 10 | 5,000 | |
| Niobium (Nb) | | 2,000 | (20) 50 | | |
| Nickel (Ni) | 5 | 5,000 | 10 | 10,000 | |
| Lead (Pb) Palladium (Pd) | 10 | 20,000 | 20 5 | | |
| Platinum (Pt) | | | 20 | • | |
| Antimony (Sb) | | 10,000 | 200 | | |
| Scandium (Sc) | | 100 | 10 | | |
| Tin (Sn) | 10 | 1,000 | 20 | 2,000 | |
| Strontium (Sr) | | 5,000 | 200 | 10,000 | |
| Thorium (Th) | 100 | 2,000 | 200 | 5,000 | |
| Thallium (Tl) | 2 | | | · | |
| Vanadium (V) | 10 | 10,000 | 20 | 20,000 | |
| _ | (50) 20 | 10,000 | (100) 50 | 20,000 | |
| Yttrium (Y) | 10 | 2,000 | 20 | 5,000 | |
| Zinc (Zn) | 200 | 10,000 | 500 | 20,000 | |
| Zirconium (Zr) | 10 | 1,000 | 20 | 2,000 | |
| | | · | · | | - |

APPENDIX A Explanation of sample description codes

| A rock B unconsolidated sediment C organic material D soil E water F other G gas Method collected (Mc) A single (grab) B composite C channel D other C dump or prospect pit D float G drill hole, well F marine G other H stream J spring J lake K aquaduct, canal, irr. ditch L atmosphere C metamorphic rock D igneous rock D igneous rock D igneous rock D igneous rock B salistone H silstone H silstone G clay C marine G sandstone H silstone G quartzite M spread Matrix (M) A silica B Fe/Mn C carbonate D clay C carbonate D clay C carbonate D clay C carbonate C cunoxidized B partially oxidized C unoxidized C unoxidized B partially oxidized Countarity C unoxidized B partially oxidized C un | Sai | mple Type (St) | St | ructural setting (Ss) |
|--|--|---|----------------------------------|--|
| B unconsolidated sediment C cryanic material C cryanic material C c other Soil Soil E water F other G gas A silica B Fe/Mm Method collected (Mc) C carbonate D clay A single (grab) E other C carbonate D clay A single (grab) E other C channel C carbonate D clay A single (grab) E other C channel C carbonate D cher A cxidized E partially oxidized C unoxidized C siliceous C siliceous C ciliceous C collect C siliceous D sericitic C feldspathic F other C collect C carbonate C feldspathic F other C zeolitic C feldspathic F other C zeolitic C sulficeous C collect C | Α | rock | Α | fracture/joint |
| D soil E water F other G gas Method collected (Mc) C carbonate D clay A single (grab) E composite C channel D other Sample source (Sc) D clay A outcrop B mine C dump or prospect pit D float E drill hole, well F marine C other H stream F aquaduct, canal, irr. ditch L atmosphere Rock type (Rt) A unidentified rock B sedimentary rock C metamorphic rock D igneous rock D igneous rock B siltstone H siltstone H claystone H siltstone I claystone H siltstone I claystone S shist C quartzite C quartzite C guartzite C guarting Matrix (M) A silica B Fe/Mn C carbonate Matrix (M) A silica B Fe/Mn C carbonate Oxidation state (Os) D char A oxidized B partially oxidized C uncondidate C uncondidate C siliceous D sericitic B argillitic C siliceous D sericitic B argillitic C siliceous D sericitic H iron/manganese I supergene C reclivation C mixed base and precious metals C mixed base and precious metals D other F rare earths D other C quartzite C quartzite C greisen C porphyry/stockwork C massive sulfide C lithophile metals in volcanic rocks C mixed base C greisen C disseminated C disseminate | В | unconsolidated sediment | | |
| E water G gas A silica B Fe/Mn C carbonate D clay A single (grab) B composite C channel D other Sample source (Sc) B partially oxidized C unoxidized A outcrop B mine C dump or prospect pit D float E drill hole, well F sarine C other C saliceous G other C siliceous C siliceous C seliceous C se | С | organic material | C | other |
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| G gas Method collected (Mc) A single (grab) B composite C channel D other Sample source (Sc) B mine C dump or prospect pit D float F dump or prospect pit F drill hole, well F stream I spring I spring I spring I spring I sawaduct, canal, irr. ditch L atmosphere Rock type (Rt) A unidentified rock B sedimentary rock C metamorphic rock E unconsolidated sediment F conglomerate S sandstone H siltstone I claystone J shale L carbonate M gneiss N schist O quartzite D marble Q skarn R phyllite or slate S felsic igneous V ultramafic igneous V other N sandstone uranium O chemical sediments P to springs V other N sandstone uranium O chemical sediments V other V other N sandstone uranium O chemical sediments P hot springs V other N sandstone uranium O chemical sediments P to springs V other N sandstone uranium O chemical sediments P to springs V other N sandstone uranium O chemical sediments P hot springs V other N sandstone uranium O chemical sediments P hot springs V placer | E | | Ma | trix (M) |
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| C dump or prospect pit D float | Α | outcrop | | |
| D float E drill hole, well F marine C siliceous G other B stream F stream F spring F other J lake K aquaduct, canal, irr. ditch L atmosphere Rock type (Rt) A base metals B precious metals C metamorphic rock B sedimentary rock C metamorphic rock C metamorphic rock C sandstone F rare earths F siltstone C claystone J shale K limestone or dolomite C quartzite F marble G skarn R phyllite or slate F felsic igneous V intermediate igneous V intermediate igneous V other V | | | Al | teration (A) |
| E drill hole, well B argillitic F marine C siliceous G other D sericitic H stream E feldspathic I spring F other J lake G zeolitic K aquaduct, canal, irr. ditch H iron/manganese L atmosphere I supergene Rock type (Rt) Ore minerals (Om) A unidentified rock B precious metals C metamorphic rock C mixed base and precious metals U unconsolidated sediment D other F conglomerate E radioactive G sandstone F rare earths H siltstone I claystone Mineral deposit form (Mdf) J shale K limestone or dolomite A vein L carbonate B replacement G quartzite B magmatic segregation F marble G skarn G greisen P mhyllite or slate H pegmatite F felsic igneous I contact metamorphic I intermediate igneous I contact metamorphic I intermediate igneous I contact metamorphic I ultramafic igneous I lithophile metals in V other V ultramafic igneous M stratiform N sandstone uranium O chemical sediments P hot springs P hot springs | | | _ | |
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Geologic age of sample (Ga) Mesh/sieve fraction (Ms) A Precambrian undifferentiated A unknown, assumed to be -80 mesh B Early Precambrian В identified as -80 mesh C Middle Precambrian identified as -100 mesh D Late Precambrian identified as -120 mesh D E Paleozoic undifferentiated E identified as -150 mesh identified as -200 mesh F Cambrian G Ordovician G identified as -60 mesh H identified as -40 mesh H Silurian I identified as -35 mesh I Devonian J identified as -30 mesh J Mississippian K Pennsylvanian K identified as -24 mesh L identified as -20 mesh M identified as -30+80 mesh L Permian Mesozoic undifferentiated N Triassic Ρ Jurassic Q Cretaceous R Tertiary undifferentiated S Paleocene T Eocene U Oligocene V Miocene W Pliocene X Quaternary undifferentiated Pleistocene Y Z Holocene Sample description (Sd) Sample description (Sd3) AL alluvium AN animal parts combined split of AS ash CS CL clay heavy-mineral-CV colluvium concentrate pan or artificial concentrate C DM detrital magnetites concentrate, high magnetic fraction concentrate, moderate magnetic fraction concentrate, low or C1 MS split of magnetite C2 non-magnetic split from C3 heavy-mineralnonmagnetic fraction concentrate GV gravel OA oxalic acid leachate GT grit VG vegetation HS heavy sand LO loess MD mud OZ ooze Sample description (Sd4) SN sand stream sediment SD glacial debris SI silt MΤ moss-trap-sediment sample TItill PTpeat material SP spruce Sample description (Sd5) ΜI mill tailings moose pellets MT

WL willow leaves

Sample preparation (Sp1)

AD ashed BR bromoform

GR ground

Sample preparation (Sp3)

FS fire assay PGE

HG hand ground

HM separated by hand magnet

RT split into red tops

Lab/submitter comments (Cm)

HG high organic content RS rock/soil survey VG visible gold

Sample preparation (Sp2)

FR Frantz isodynamic separator

PV pulverized

Field treatment (Ft)

A air-dried

B sieved

C panned concentrate

D washed

E other

Lat/lon precision (LL precis)

A apparently accurate to nearest second

B apparently accurate to nearest minute

C apparently accurate to nearest degree

Information for monthly listing of USGS publications:

OF-95-625. Digital release of stream-sediment, heavy-mineral-concentrate, soil, and other geochemical data collected in the Nabesna 1 x 3 degree quadrangle, Alaska, by S.L. George. 1995. One 3-1/2 inch diskette.

Requirements: IBM PC or compatible computer; 3-1/2 inch, 1.44 Mb floppy disk drive; PC or MS DOS; software capable of importing dBase III .DBF files.